● PRINTER RUSH ●
(PTO ASSISTANCE)

Application : 09/747,464 **Examiner :** Shapiro **GAU :** 2673

From: J. Robbins **Location:** IDC FMF FDC **Date:** 12-8-05

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☐ 1449		☐ Continuing Data
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☐ IIFW		☐ Fees
☐ SRFW		☐ Other
☐ DRW		
☐ OATH		
☐ 312		
☒ SPEC	12-22-00	

[RUSH] **MESSAGE:** Spec 12-22-00, pages 8-10 contains illegible subscript data.

Thank You
Jo

[XRUSH] **RESPONSE:**

See misc comm

Done

INITIALS:

NOTE: This form will be included as part of the official USPTO record, with the Response document coded as XRUSH.

REV 10/04

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S)	:	Kirk Ouellette
FOR	:	**SHARED PIXEL ELECTROLUMINESCENT DISPLAY DRIVER SYSTEM**
SERIAL NO.	:	09/747,464
FILED	:	December 22, 2000
EXAMINER	:	L. Shapiro
ART UNIT	:	2677
NOTICE TO FILE CORRECTED APPLICATION PAPERS		December 30, 2005
CONFIRMATION NO.	:	9818
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RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Via email Rori.burch@uspto.gov

MAIL STOP MISSING PARTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Responsive to the Notice to File Corrected Application Papers issued December 30, 2005 on the above-captioned patent application, Applicants are submitting herewith specification pages 8, 9, and 10. Also, attached is the Patent Office return copy of the Notice to File Corrected Application Papers.

The foregoing submission is believed to meet the requirements of the Notice to File Corrected Application Papers, and the Applicants await further action on the application from the Patent and Trademark Office.

Respectfully submitted,

FAY, SHARPE, FAGAN,
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1/27/06
Date

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CERTIFICATE OF MAILING

I certify that this Response to Notice to File Corrected Application Papers and Submission of Formal Drawings is being

- ☒ sent via email to Rori.burch@uspto.gov
- ☐ deposited with the United States Postal Service as First Class mail under 37 C.F.R. § 1.8, addressed to Mail Stop Missing Parts, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.
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1-27-06	Elaine M. Checovich

ELAINE M. CHECOVICH

Table 1

Comparative Energy Efficiency for Half Screen Bar Pattern

Modulation Voltage (volts)	Scan Method	Luminance (cd/m2)	Row Power (watts)	Column Power (watts)	Efficiency (lumens/watt)	Efficiency Ratio
30	single	12	8.1	10.8	0.62	
30	double	16	10.1	12.8	0.67	1.1
40	single	27	9.1	17.2	1.04	
40	double	38	12.2	18.5	1.24	1.2
50	single	43	11.0	24.2	1.23	
50	double	74	16.2	27.0	1.72	1.4
60	single	56	13.1	33.2	1.22	
60	double	102	20.0	37.0	1.78	1.5

Table 2

Comparative Energy Efficiency for Full Screen Illumination

Modulation Voltage (volts)	Scan Method	Luminance (cd/m2)	Row Power (watts)	Column Power (watts)	Efficiency (lumens/watt)	Efficiency Ratio
30	single	8	8.9	9.6	0.42	
30	double	8	11.2	10.6	0.34	0.8
40	single	25	12.3	12.9	1.00	
40	double	28	17.0	14.8	0.88	0.9
50	single	42	16.0	17.8	1.22	
50	double	56	22.4	20.8	1.29	1.1
60	single	56	19.9	24.7	1.26	
60	double	87	29.0	29.5	1.49	1.2

A simplified analysis of the relative energy efficiency for double row scanning as compared to single row scanning is as follows. If P_x is the power dissipated in an addressed row, and P_y is the power dissipated in a non-addressed row, then for single line scanning of a display with n rows the overall electrical to optical energy efficiency, E_s, for the display is given by

$$E_s = \eta_p \eta_s P_x /(P_x + n P_y) \qquad (1)$$

where η_p is the electrical to optical energy conversion efficiency for an addressed row and η_s is the efficiency of electrical power transfer to the panel under the load conditions for single line scanning. If double line scanning is used, the energy efficiency is given by

$$E_d = 2\eta_p \eta_d P_x/(2 P_x + n P_y) \qquad (2).$$

where η_d is the efficiency of electrical power transfer to the panel under the load conditions for double line scanning and the other parameters are a previously defined. In the limit for high resolution displays, i.e. where $n P_y >> P_x$, these expressions simplify to

$$E_s = \eta_p \eta_s \; P_x /n P_y \qquad (3)$$

and

$$E_d = 2\eta_p \eta_d n P_y / n P_y \qquad (4)$$

In view of the above equations, it can be seen that if $\eta_d > \eta_s/2$, the efficiency for double line scanning will be higher than for single line scanning. Of course, it should be noted that although η_d will generally be less than η_s due to higher loading of the drivers for double line scanning, the inequality above can be satisfied under many circumstances, particularly if the driver impedances are relatively low.

The data in Tables 1 and 2 can be understood in terms of the analysis above. The column power to the non-addressed rows is relatively low for the uniformly illuminated panel (Table 2). In this case, the voltage on all columns is the same, and the power dissipated in the non-addressed rows due to capacitive coupling with the columns is minimal. It should also be noted that the luminosity is not significantly higher for double line scanning, particularly for lower modulation voltages. This indicates a significant voltage reduction at the pixels resulting from a voltage drop in the drivers due to an increased load for double line scanning.

Correspondingly, the ratio of efficiencies for double line scanning as compared to single line scanning is close to unity, and in fact is somewhat less than unity for the lower modulation voltages.

By contrast, for the half screen bar pattern (Table 1), the power dissipation in the non-addressed rows is higher and this is reflected in the higher measured column power relative to the row power and in the higher ratio of the measured efficiency for double line scanning over single line scanning, despite an overall higher load on the row and column drivers and a corresponding reduction in the electrical power transfer efficiencies η_s and η_d. The efficiency gains with double line scanning are greatest for the highest modulation voltage, since the relative power dissipation in non-addressed rows is largest in this case.

The test pattern of Table 2 is more representative of a typical video image and is therefore more illustrative of the energy efficiency improvements inherent in the double line scanning method of the present invention. It should be noted that the efficiency gains with double line scanning will be even higher than indicated above if lower impedance drivers are used.

Example 2 Shared Sub-pixel Design

Figure 5 illustrates a further embodiment of the invention wherein a triad pixel design is provided for a full colour display. According to this embodiment red, green and blue physical display pixels are selected or addressed as a triangular array of sub-pixels chosen from two adjacent rows of individual sub-pixels. In the illustrated embodiment, the number of physical display pixels in the superset from which sub-pixel sets are selected is five. The number of sub-pixels in a selected set is three (one red, one green and one blue sub-pixel), and the number of pixels of video data capable of being illustrated by each selected set is also three. A person of ordinary skill in the art may conceive of other operable configurations of triad pixel design.